

REMARKS

Claims 1-27 were pending in the application. Applicants cancelled claims 22 and 23 without prejudice or disclaimer, and hence claims 1-21 and 24-27 are pending. Applicants reserve the right to file a continuation application to capture the subject matter of originally filed claims 22 and 23.

The title of the Specification is objected to. Claims 1-3, 8, 9, 13, 15, 17-23 and 27 are rejected under 35 U.S.C. §102(e). Claims 4, 5 and 7 are rejected under 35 U.S.C. §103(a). Claims 6, 10-12, 14, 16, 24, 25 and 26 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims. Applicants address these objections and rejections below.

Applicants amended claims 24 and 27 to be rewritten in independent form and not to overcome prior art. Further, Applicants amended claim 16 to correct a typographical mistake. Hence, no prosecution history estoppel arises from the amendments to claims 16, 24 and 27. *Festo Corp. v. Shoketsu Kinzoku Kogyo Kabushiki Co.*, 62 U.S.P.Q.2d 1705, 1711-12 (2002); 56 U.S.P.Q.2d 1865, 1870 (Fed. Cir. 2000). Further, the amendments made to claims 16, 24 and 27 were not made for a substantial reason related to patentability and therefore no prosecution history estoppel arises from such amendments. *See Festo Corp.*, 62 U.S.P.Q.2d 1705 at 1707 (2002); *Warner-Jenkinson Co. v. Hilton Davis Chemical Co.*, 41 U.S.P.Q.2d 1865, 1873 (1997).

I. OBJECTIONS TO THE SPECIFICATION:

The Examiner has objected to the title of the Specification for allegedly being non descriptive. Office Action (6/8/2006), page 2. Applicants amended the title of the Specification herein to be more descriptive. Accordingly, Applicants respectfully request the Examiner to withdraw the objection to the title of the Specification.

II. REJECTIONS UNDER 35 U.S.C. §102(e):

The Examiner has rejected claims 1-3, 8, 9, 13, 15, 17-23 and 27 under 35 U.S.C. §102(e) as being anticipated by Kroyan et al. (U.S. Publication No.

2005/0188338) (hereinafter "Kroyan"). Applicants respectfully traverse these rejections for at least the reasons stated below and respectfully request the Examiner to reconsider and withdraw these rejections.

For a claim to be anticipated under 35 U.S.C. §102, each and every claim limitation must be found within the cited prior art reference and arranged as required by the claim. M.P.E.P. §2131.

Applicants cancelled claims 22 and 23 and hence the rejections to claims 22 and 23 are moot.

Applicants respectfully assert that Kroyan does not disclose "based on the simulating step, identifying portions of the layout representation which include structures demonstrating poor manufacturability" as recited in claim 1. The Examiner cites paragraph [0021] of Kroyan as disclosing the above-cited claim limitation. Office Action (6/8/2006), page 3. Applicants respectfully traverse and assert that Kroyan instead discloses that there may be portions of the design that have a poor manufacturability, which limits the entire process. [0021]. Kroyan further discloses that these specific localized problems are the typical cause of circuit failures or loss of yield. [0021]. Kroyan additionally discloses it is therefore possible to locally optimize manufacturability of difficult patterns without over-specifying the global design rules and the overall process tolerance. [0021]. Hence, Kroyan discloses that there may be portions of the design that have a poor manufacturability. However, there is no language in the cited passage that discloses based on a simulating step, identifying portions of the layout presentation. Neither is there any language in the cited passage that discloses based on a simulating step, identifying portions of the layout presentation which includes structures demonstrating poor manufacturability. Thus, Kroyan does not disclose all of the limitations of claim 1, and thus Kroyan does not anticipate claim 1. M.P.E.P. §2131.

Applicants further assert that Kroyan does not disclose "based on the simulating step, identifying portions of the layout representation in which extra manufacturability margin is present" as recited claim 1. The Examiner cites

paragraph [0046] of Kroyan as disclosing the above-cited claim limitation. Office Action (6/8/2006), page 3. Applicants respectfully traverse and assert that Kroyan instead discloses that the analysis process performed by the analysis engine 203 determines distinct pattern types which have different criticality leading to different manufacturability margin requirements. [0046]. Kroyan further discloses that a new set of 'refined' design rules emerges in association with each pattern type. [0046]. Hence, Kroyan discloses refining design rules for each pattern type. There is no language in the cited passage that discloses based on a simulating step, identifying portions of the layout representation. Neither is there any language in the cited passage that discloses based on a simulating step, identifying portions of the layout representation in which extra manufacturability margin is present. Thus, Kroyan does not disclose all of the limitations of claim 1, and thus Kroyan does not anticipate claim 1. M.P.E.P. §2131.

Applicants further assert that Kroyan does not disclose "wherein modifying the design rule compliant layout includes modifying the layout in violation of at least one design rule with which the layout is compliant" as recited in claim 27. The Examiner cites paragraph [0080] of Kroyan as disclosing the above-cited claim limitation. Office Action (6/8/2006), page 6. Applicants respectfully traverse and assert that Kroyan instead discloses that the layout manufacturability enhancement system 5100 further comprises a layout modification instruction generator 5109 that determines the relationship between the non-compliance properties of the 'weak spots' and the localized geometrical configuration of layout patterns within a range of influence. [0080]. There is no language in the cited passage that discloses modifying a design rule compliant layout. Neither is there any language in the cited passage that discloses modifying a design rule compliant layout which includes modifying the layout in violation of at least one design rule which the layout is compliant. Thus, Kroyan does not disclose all of the limitations of claim 27, and thus Kroyan does not anticipate claim 27. M.P.E.P. §2131.

Claims 2-3, 8, 9, 13, 15 and 17-21 each recite combinations of claim 1, and hence claims 2-3, 8, 9, 13, 15 and 17-21 are not anticipated by Kroyan for at least the reasons that claim 1 is not anticipated by Kroyan.

Applicants further assert that Kroyan does not disclose "performing at least one optical proximity correction (OPC) on the initial layout representation before step (b)" as recited in claim 3. The Examiner cites paragraph [0063] of Kroyan as disclosing the above-cited claim limitation. Office Action (6/8/2006), page 4. Applicants respectfully traverse and assert that Kroyan instead discloses that the layout processing engine can be a general optical proximity correction (OPC) implementation process, a complex RET flow 2000 such as a combination of phase shift mask (PSM) and OPC; a layout optimization flow 5100 based on modification and/or compaction; and, preferably, mask data preparation (MDP), for example, fracturing; or even a more complex flow containing various combinations of all of the above. [0063]. There is no language in the cited passage that discloses performing at least one optical proximity correction on the initial layout representation before step (b). Thus, Kroyan does not disclose all of the limitations of claim 3, and thus Kroyan does not anticipate claim 3. M.P.E.P. §2131.

Applicants further assert that Kroyan does not disclose "wherein for portions of the layout representation in which extra manufacturability margin is present, step (e) includes: compacting at least a portion of the layout representation" as recited in claim 15. The Examiner cites paragraph [0046] of Kroyan as disclosing the above-cited claim limitation. Office Action (6/8/2006), page 5. Applicants respectfully traverse and assert that Kroyan instead discloses that for pattern types with little or no manufacturability margin, it may be necessary to relax the design rules to increase the manufacturability margin, whereas, for pattern types with excess manufacturability margin, it may be possible to tighten or compact the design. [0046]. Hence, Kroyan discloses that for pattern types with excess manufacturability margin, it may be possible to tighten the design rules. Tightening or compacting the design rules is not the same as compacting at least a portion of the layout representation. Neither is there any language in the cited passage that discloses compacting at least a portion of

the layout representation when extra manufacturability margin is present. Thus, Kroyan does not disclose all of the limitations of claim 15, and thus Kroyan does not anticipate claim 15. M.P.E.P. §2131.

Applicants further assert that Kroyan does not disclose "wherein step (e) is performed despite there existing no violation of any of the plurality of design rules" as recited in claim 19. The Examiner cites paragraph [0046] of Kroyan as disclosing the above-cited claim limitation. Office Action (6/8/2006), page 6. Applicants respectfully traverse and assert that Kroyan instead discloses that the analysis performed by the analysis engine 203 determines distinct pattern types which, although resulting from the same design rules, have different criticality leading to different manufacturability margin requirements. [0046]. There is no language in the cited passage that disclose that the step of "modifying at least one of (i) portions of the layout representation which include structures demonstrating poor manufacturability and (ii) portions of the layout representation in which extra manufacturability margin is present" is performed despite there existing no violation of any of the plurality of design rules. Thus, Kroyan does not disclose all of the limitations of claim 19, and thus Kroyan does not anticipate claim 19. M.P.E.P. §2131.

Applicants further assert that Kroyan does not disclose "wherein step (c) includes providing a graphical representation indicating structures demonstrating poor manufacturability" as recited in claim 20. The Examiner cites paragraphs [0086-0087] of Kroyan as disclosing the above-cited claim limitation. Office Action (6/8/2006), page 6. Applicants respectfully traverse and assert that Kroyan instead discloses that the instruction generator 6095 analyzes the output on-wafer patterns and calculates functional relationships between non-compliant manufacturability parameters and the layout variables. [0086]. Kroyan further discloses that the graphical configuration of the layout is quantified by assessment of pattern shapes and measurement of orthogonal distances of feature dimensions, spacing, gaps, pitch, and the like, as shown in Figure 12. [0087]. Hence, Kroyan discloses a graphical configuration of a layout where the pattern shapes and measurements of orthogonal

distances are assessed. However, there is no language in the cited passages that discloses based on a simulating step, identifying those portions of the layout representation which includes structures demonstrating poor manufacturability, where the step includes providing a graphical representation indicating structures demonstrating poor manufacturability. Thus, Kroyan does not disclose all of the limitations of claim 20, and thus Kroyan does not anticipate claim 20. M.P.E.P. §2131.

Applicants further assert that Kroyan does not disclose "wherein step (d) includes providing a graphical representation identifying portions of the layout representation in which extra manufacturability margin is present" as recited in claim 21. The Examiner cites paragraph [0087] of Kroyan as disclosing the above-cited claim limitation. Office Action (6/8/2006), page 6. Kroyan further discloses that the graphical configuration of the layout is quantified by assessment of pattern shapes and measurement of orthogonal distances of feature dimensions, spacing, gaps, pitch, and the like, as shown in Figure 12. [0087]. Hence, Kroyan discloses a graphical configuration of a layout where the pattern shapes and measurements of orthogonal distances are assessed. However, there is no language in the cited passages that discloses based on a simulating step, identifying portions of the layout representation in which extra manufacturability margin is present, where the step includes providing a graphical representation identifying portions of the layout representation in which extra manufacturability margin is present. Thus, Kroyan does not disclose all of the limitations of claim 21, and thus Kroyan does not anticipate claim 21. M.P.E.P. §2131.

As a result of the foregoing, Applicants respectfully assert that not each and every claim limitation was found within Kroyan, and thus claims 1-3, 8, 9, 13, 15, 17-21 and 27 are not anticipated by Kroyan. M.P.E.P. §2131.

III. REJECTIONS UNDER 35 U.S.C. §103(a):

The Examiner has rejected claims 4, 5 and 7 under 35 U.S.C. §103(a) as being unpatentable over Kroyan in view of Anderson et al. (U.S. Patent No. 6,425,113)

(hereinafter "Anderson"). Applicants respectfully traverse these rejections for at least the reasons stated below and respectfully request the Examiner to reconsider and withdraw these rejections.

- A. Examiner's motivation for modifying Kroyan to include the missing claim limitation of claim 4 is insufficient to establish a *prima facie* case of obviousness.

Most if not all inventions arise from a combination of old elements. *See In re Rouffet*, 47 U.S.P.Q.2d 1453, 1457 (Fed. Cir. 1998). Obviousness is determined from the vantage point of a hypothetical person having ordinary skill in the art to which the patent pertains. *In re Rouffet*, 47 U.S.P.Q.2d 1453, 1457 (Fed. Cir. 1998). Therefore, an Examiner may often find every element of a claimed invention in the prior art. *Id.* However, identification in the prior art of each individual part claimed is insufficient to defeat patentability of the whole claimed invention. *See Id.* In order to establish a *prima facie* case of obviousness, the Examiner must show reasons that the skilled artisan, confronted with the same problems as the inventor and with no knowledge of the claimed invention, would select the elements from the cited prior art references for combination in the manner claimed. *In re Rouffet*, 47 U.S.P.Q.2d 1453, 1458 (Fed. Cir. 1998). That is, the Examiner must provide some suggestion or motivation, either in the references themselves, the knowledge of one of ordinary skill in the art, or, in some case, the nature of the problem to be solved, to modify the reference or to combine reference teachings. *See In re Dembiczak*, 175 F.3d 994, 999, 50 U.S.P.Q.2d 1614, 1617 (Fed. Cir. 1999). Whether the Examiner relies on an express or an implicit showing, the Examiner must provide particular findings related thereto. *In re Kotzab*, 55 U.S.P.Q.2d 1313, 1317 (Fed. Cir. 2000).

The Examiner admits that Kroyan does not teach "wherein step (c) includes: performing optical rule checking (ORC) on the simulated layout representation" as recited in claim 4. Office Action (6/8/2006), page 7. The Examiner asserts that Anderson teaches this missing claim limitation. *Id.* The Examiner modifies Kroyan with Anderson to include the above-cited claim limitation because "Anderson would improve the invention of Kroyan by providing an ORC component whose job is to determine whether the applied OPC in Kroyan will have the desired corrective effect

(see Anderson, Col 2, lines 50-55)." Office Action (6/8/2006), page 7. The Examiner's motivation is insufficient to establish a *prima facie* case of obviousness in rejecting claims 4-5 and 7.

The Examiner's motivation ("Anderson would improve the invention of Kroyan by providing an ORC component whose job is to determine whether the applied OPC in Kroyan will have the desired corrective effect") does not provide reasons, as discussed further below, that the skilled artisan, confronted with the same problems as the inventor and with no knowledge of the claimed invention, would modify Kroyan to include the missing claim limitation of claim 4. Accordingly, the Examiner has not presented a *prima facie* case of obviousness for rejecting claims 4-5 and 7. *In re Rouffet*, 47 U.S.P.Q.2d 1453, 1458 (Fed. Cir. 1998).

As stated above, the Examiner cites column 2, lines 50-55 of Anderson as support for the Examiner's motivation. Anderson teaches that the data generated by the OPC tool is then typically imported into a simulated tool, to confirm that the OPC will have the desired corrective effect. Column 2, lines 50-52. Anderson further teaches that this is sometimes called an optical and process rule check, or ORC. Column 2, lines 52-53. Anderson further teaches that once this check is complete, the data is exported for use in IC manufacturing process 395. Column 2, lines 53-55. Hence, Anderson teaches that the data generated by the OPC tool is imported into a simulated tool to confirm that the OPC will have the desired corrective effect. Importing data generated by the OPC tool simulated tool to confirm that the OPC will have the desired corrective effect does not provide reasons that the skilled artisan, confronted with the same problems as the inventor and with no knowledge of the claimed invention, would modify Kroyan, which teaches overcoming the problems of incorporating manufacturability check or verification into the front-end design (paragraphs [0013-0019]), to perform optical rule checking (ORC) on the simulated layout representation in connection with identifying portions of the layout representation which includes structures demonstrating poor manufacturability (missing claim limitation). As a result, the Examiner's cited passages do not provide reasons that the skilled artisan, confronted with the same problems as the inventor and

with no knowledge of the claimed invention, would modify Kroyan to include the missing claim limitation of claim 4. Accordingly, the Examiner has not presented a *prima facie* case of obviousness for rejecting claims 4-5 and 7. *In re Rouffet*, 47 U.S.P.Q.2d 1453, 1458 (Fed. Cir. 1998).

Further, Kroyan addresses the problem of incorporating manufacturability check or verification into the front-end design. [0013-0019]. The Examiner has not provided any reasons as to why one skilled in the art would modify Kroyan, which teaches overcoming the problems of incorporating manufacturability check or verification into the front-end design, to perform optical rule checking (ORC) on the simulated layout representation in connection with identifying portions of the layout representation which includes structures demonstrating poor manufacturability (missing claim limitation). The Examiner's motivation ("Anderson would improve the invention of Kroyan by providing an ORC component whose job is to determine whether the applied OPC in Kroyan will have the desired corrective effect") does not provide such reasoning. The Examiner has not provided any rationale connection between overcoming the problems of incorporating manufacturability check or verification into the front-end design (purpose of Kroyan) and providing an ORC component whose job is to determine whether the applied OPC in Kroyan will have the desired corrective effect (Examiner's motivation). Neither has the Examiner provided any rationale connection between performing optical rule checking (ORC) on the simulated layout representation in connection with identifying portions of the layout representation which includes structures demonstrating poor manufacturability (missing claim limitation) and providing an ORC component whose job is to determine whether the applied OPC in Kroyan will have the desired corrective effect (Examiner's motivation). Hence, the Examiner's motivation does not provide reasons that the skilled artisan, confronted with the same problems as the inventor and with no knowledge of the claimed invention, would modify Kroyan to include the missing claim limitation of claim 4. Accordingly, the Examiner has not presented a *prima facie* case of obviousness for rejecting claims 4-5 and 7. *In re Rouffet*, 47 U.S.P.Q.2d 1453, 1458 (Fed. Cir. 1998).

- B. Kroyan and Anderson, taken singly or in combination, do not teach or suggest the following claim limitations.

Applicants respectfully assert that Kroyan and Anderson do not teach or suggest "wherein performing ORC includes checking at least one of aerial image metrics, resist image metrics and post exposure bake metrics" as recited in claim 5. The Examiner cites paragraph [0076] of Kroyan as teaching the above-cited claim limitation. Office Action (6/8/2006), page 7-8. Applicants respectfully traverse and assert that Kroyan instead teaches that the manufacturability parameters include numeric values, such as critical dimensions, image contrast, image log-slope, a mask error enhancement factor (MEEF), depth of focus (DOF), exposure latitude (EL), and the like, or more complex quantitative descriptions of manufacturability, such as process window (PW), or the like, for example. [0076]. There is no language in the cited passage that teaches performing ORC. Further, there is no language in the cited passage that teaches performing ORC includes checking at least one of aerial image metrics, resist image metrics and post exposure bake metrics. Therefore, the Examiner has not presented a *prima facie* case of obviousness in rejecting claim 4, since the Examiner is relying upon incorrect, factual predicates in support of the rejection. *In re Rouffet*, 47 U.S.P.Q.2d 1453, 1455 (Fed. Cir. 1998).

IV. ALLOWABLE SUBJECT MATTER:

Applicants appreciate the indication of allowability of claims 6, 10-12, 14, 16, 24, 25 and 26.

V. CONCLUSION:

As a result of the foregoing, it is asserted by Applicants that claims 1-21 and 24-27 in the Application are in condition for allowance, and Applicants respectfully request an allowance of such claims. Applicants respectfully request that the Examiner call Applicants' attorney at the below listed number if the Examiner believes that such a discussion would be helpful in resolving any remaining issues.

Respectfully submitted,

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